School Leaders Mostly Mystified by Computer Science Education

By Dian Schaffhauser 02/02/15

Low-income schools are less likely than higher income schools to offer computer science (CS) classes. In all schools where computer science courses are part of the curriculum, there is no standardized set of learning standards. And most of the time CS classes are categorized as electives with a vocational slant. These results and others surfaced in a survey administered by the Computer Science Teachers Association (CSTA), a membership organization that promotes the teaching of computer science and other computing disciplines.

The survey was issued online to 20,000 secondary school leaders across the country; 503 people responded.

Of those, 77.5 percent reported that their schools offer CS courses, but those courses tend to be more common in the better-funded ones. Of the 27 percent of schools where a majority of students qualify for free or reduced lunch, six of 10 have CS courses. In the 44 percent of schools where the majority of students don't qualify for free lunch, eight of 10 offer CS classes. In lower income schools with CS courses, four of 10 also offer after school or extracurricular programs in the subject. At higher income schools, that count was much higher — 10 of 10.

The term "computer science" boggled some respondents. When asked which kinds of CS classes their schools provided, some answered, "business management," "yearbook layout," "artificial intelligence," "robotics," "office applications" and "automated design."

"This broad use of 'computer science' to encompass curriculum and courses that would not be considered 'computer science' at a college/university or professional level indicates a need for educational community consensus on a common definition of computer science education and curricular content," the report's authors stated.

Only four in 10 schools count a CS class towards a requirement in math, science or technology; the remainder tends to count it as an elective. This becomes a problem, the report noted, because "electives are often culturally and academically regarded as filler classes in a student's schedule." Also, electives don't tend to count toward college admittance.

The most common CS class offered across the board in high schools is Web design and development, followed by introduction to computer science, computer graphics and programming. The top 4 content areas covered in the curriculum of the CS courses are problem solving in 65 percent of the classes, ethical and social issues and graphics, tied at 57 percent, and Web development at 51 percent. Areas

considered "core" to CS, according to the organization, such as testing and debugging and analysis of algorithms, came in much lower on the list — 34 percent and 32 percent, respectively.

The report's authors offered several observations based on the findings of their survey.

In lower income schools, a solid third have no computer science whatsoever, versus only 16 percent in higher income schools. Because the "development" of a computer scientist is a multi-year "pathway," the fact that students in lower income schools have little or no access to CS over the course of their high school years "puts them at a disadvantage for both future college and career pursuits" and perpetuates a "vicious circle" for students who are economically disadvantaged.

There's still a "huge misunderstanding of what CS is and what it isn't" at the high school level, the report said. Without a standardized set of CS offerings, colleges and universities "will continue to resist adding CS courses as accepted math or science credits for admission." At the same time, students in those schools without a solid CS program will enter college "woefully behind" others.

Finally, there's a "misperception" on the part of many schools that "simply exposing students to technology as a tool or offering an hour of programming experience is equivalent to offering them the true CS education pathways that are needed to make students college- and career-ready."

The organization recommended four calls to action:

> High schools begin counting computer science courses toward graduation requirements;
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> Schools come to an agreement about computer science curriculum and what common standards would be for all states and districts;
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> Administrators ensure that computer science classes count toward a math or science credit; and
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> A national funding plan be created to give all students "equitable access to computer science education."

The study was funded by Oracle Academy, which provides free software, curriculum, and other resources to schools.

The study's results accompany this article as a pdf.